

**What We Claim Is:**

1. An automatic transmission for a vehicle comprising:
  - a housing having a support portion formed on an outside surface of the housing, and a coupling portion provided proximate the support portion;
  - a gear transmission unit disposed in the housing having at least one hydraulic actuator controllable to provide a plurality of output speeds;
  - a transmission throttle valve operable to regulate the hydraulic pressure provided to the hydraulic actuators, the transmission throttle valve including a transmission throttle valve shaft proximate the coupling portion; and
  - an electromagnetic actuator coupled to the support portion of the housing, the electromagnetic actuator coupled to the transmission throttle valve shaft to regulate the hydraulic pressure of the transmission throttle valve.
2. The automatic transmission of claim 1, wherein the electromagnetic actuator comprises a rotary electric motor coupled to an actuator shaft via a reduction transmission so that the position of the actuator shaft is positionable by a control unit.
3. The automatic transmission of claim 1, wherein the electromagnetic actuator comprises a linear electric motor connected to an actuator shaft so that the position of the actuator shaft is positionable by a control unit.
4. The automatic transmission of claim 2, wherein the electromagnetic actuator comprises a position sensor that provides a signal to the control unit indicating the position of the actuator shaft relative to a reference position, the actuator shaft connected to the transmission throttle valve shaft.
5. The automatic transmission of claim 2, wherein the electromagnetic actuator comprises an actuator unit disposed external to the transmission housing.

6. The automatic transmission of claim 5, wherein the reduction transmission comprises a geared reducing unit and a geared reversing unit.
7. The automatic transmission of claim 6, wherein the electric motor and reduction transmission are generally isolated thermally from the transmission housing.
8. The automatic transmission of claim 6, wherein the reduction transmission comprises a geared reduction of 12:1
9. The automatic transmission of claim 8, wherein the reversing transmission comprises at least one involute gear formed over at least  $\frac{1}{4}$  of the circumference of a gear body.
10. An electronic transmission throttle valve actuator comprising:
  - a housing having an actuator shaft so that the actuator shaft moves a transmission throttle valve;
  - an electrical connector formed on the housing;
  - a position sensor that provides a signal indicating the position of the actuator shaft;
  - an electric motor disposed in the housing the motor connectable to a control unit via the electrical connector;
  - a reduction transmission disposed in the housing and connected to the electric motor and the actuator shaft via a sector gear mounted on the actuator shaft; and
  - a reversing gear unit disposed in the housing, the reversing gear unit coupled to the actuator shaft to drive an output gear having a flexible shaft coupling.
11. The electronic transmission throttle valve actuator of claim 10, wherein the housing comprises a first compartment enclosing the electric motor and position sensor.
12. The electronic transmission throttle valve actuator of claim 11, wherein the housing further comprises a second compartment enclosing the reversing transmission.
13. The electronic transmission throttle valve actuator of claim 11, wherein the electric motor comprises a rotary electric motor.

14. The electronic transmission throttle valve actuator of claim 11, wherein the electric motor comprises a linear electric motor.

15. The electronic transmission throttle valve actuator of claim 12, wherein the first compartment further comprises:

a rotary return spring coupled to the actuator shaft to bias the shaft to a reference position; and

a stop member coupled to the reduction transmission.

16. The electronic transmission throttle valve actuator of claim 15, wherein the reduction transmission comprises a geared reduction of 12:1

17. The electronic transmission throttle valve actuator of claim 16, wherein the reversing transmission comprises at least one involute gear formed over at least  $\frac{1}{4}$  of the circumference of a gear body.

18. A method of actuating a transmission throttle valve disposed in an automatic transmission, the method comprising:

providing a shaft coupled to the transmission throttle valve so that the transmission throttle valve is controlled by the shaft; and

positioning the shaft with an electric motor disposed external to the automatic transmission.

19. The method of claim 18, wherein the positioning comprises rotating the shaft over a plurality of angular positions over a regular interval of five degrees of rotation.

20. The method of claim 19, wherein the rotating comprises providing a biasing torque on the shaft depending on the angle of rotation relative to an initial position so that the shaft is rotated to an angular position of approximately 45 degrees about an axis from a referential position.